VOL. XII. NO. 11.—BOTANICAL GAZETTE.—NOV., 1887.

Notes on Umbelliferæ of E. United States. VII.

JOHN M. COULTER AND J. N. ROSE.

(WITH PLATE XV.)

TREPOCARPUS Nutt.—Fruit linear-oblong, flattened laterally: carpel somewhat dorsally flattened, with the 5 primary ribs filiform or obsolete, the 4 secondary ones prominent: oil-ducts solitary under secondary ribs, two on commissural side: stylopodium conical, with very short style (figs. 87, 88).—Glabrous annuals, with thin pinnately decompound leaves and linear segments, lateral few-rayed umbels opposite the leaves, white flowers, and prominent calyx-teeth.

1. **T. Æthusæ** Nutt. DC. Mem. Umbel. 56, t. 14. From a few inches to three feet high: umbels 2 to 5-rayed; umbellets few-flowered: involucre and involucels of few linear bracts, entire or divided: fruit 4 to 5 lines long; pericarp wall thick and mostly made up of strengthening cells: secondary ribs corky.—From Arkansas to Louisiana, Indian Territory and Texas. Fl. July.

SIUM Linn.—Fruit ovate to oblong, flattened laterally: carpel with 5 corky primary ribs (each with a well-developed group of strengthening cells at tip): oil-ducts 1 to 3 in the intervals (never solitary in all the intervals), 2 to 6 on commissural side, near center of pericarp: seed-section roundish or sub-angular: stylopodium depressed or wanting, with short style (figs. 89–92).—Smooth perennials growing in water or wet places, with pinnate leaves and serrate or pinnatifid leaflets, involucre and involucels of several bracts, and white flowers, in summer.

Bentham and Hooker refer our two species of Sium to Apium, but to us they seem abundantly distinct, as also indicated by Watson, Bot. Calif. i. 261. The oil-ducts are never solitary in all the intervals, and the prominent group of strengthening cells in the outer edge of each rib still further emphasizes the distinction. There is no better defined generic group in Umbelliferæ than that formed by our

two species of Sium, being so nearly identical in fruit and so easily separated from all other genera.

1. **S. cicutæfolium** Gmelin, Syst. 2. 482. Stout, 2 to 6 feet high: leaflets 3 to 8 pairs, linear to lanceolate, sharply serrate and acuminate, 2 to 5 inches long: fruit larger in section and with more prominent ribs than in the next: oil-ducts 2 to 6 on commissural side (figs. 89, 90). *S. lineare* Michx. *Apium lineare* Benth. & Hook.—Throughout our range, and west to the Pacific.

2. **S. Carsoni** Durand, Gray's Man. 196. Weak, 1 to 2 feet high: leaflets 1 to 3 pairs, linear, sharply serrate, 1 to 2 inches long: when submersed or floating, very thin, ovate to oblong, usually lacinate-toothed or dissected, the leaf sometimes reduced to the terminal leaflet: oil-ducts 2 to 4 on commissural side (figs. 91, 92). *Apium Carsoni* Benth. & Hook.—Pennsylvania, Connecticut, Rhode Island, and Massachusetts.

BERULA Koch.—Fruit nearly globose, somewhat flattened laterally, emarginate at base: carpel with 5 filiform primary ribs: pericarp thick and corky, with no strengthening cells: oil-ducts numerous and contiguous, closely surrounding the seed cavity: seed-section round: stylopodium conical (figs. 93, 94).—Smooth aquatic perennial, with pinnate leaves and variously cut leaflets, and white flowers, in summer.

1. **B. angustifolia** Koch, Deutsch. Fl. 2.455. Stout, ½ to 3 feet high: leaflets 5 to 8 pairs, linear to oblong or ovate, serrate to cut-toothed, sometimes crenate: fruit ¾ line long. *Sium angustifolium* L.—Throughout our range and westward.

CRANTZIA Nutt.—Fruit globose, slightly flattened laterally: carpel with 5 primary ribs, each subtended by a small group of strengthening cells; the laterals thick and corky: the others filiform: oil-ducts solitary in the intervals, two on the commissural side: seed-section round (figs. 95, 96).—Small perennials, creeping and rooting in the mud, with hollow cylindrical or awl-shaped nodose petioles in place of leaves, simple few-flowered umbels, and white flowers. July.

1. **C. lineata** Nutt. Genera, 1. 178. Leaves very obtuse, 1 to 3 inches long, 1 to 2 lines broad: fruit a line long, the thick lateral wings forming a corky margin.—In brackish marshes along the coast, from Massachusetts to Mississippi.

CICUTA Linn.—Fruit ovoid to oblong, slightly flattened laterally: carpel with 5 strong flattish corky primary ribs (laterals somewhat larger): oil-ducts solitary in the intervals, two on the commissural side: stylopodium conical or depressed (figs. 97–100).—Smooth poisonous marsh perennials, with pinnately or ternately compound leaves, and white flowers, in summer.

Bentham and Hooker, in Gen. Plant. i. 889, say "stylopodia crassiuscula, depressa, integra;" and Sereno Watson, in Bot. Calif. 1.260, says "stylopodium depressed." While this is apparently true in most specimens of mature fruit, in many younger specimens, and some mature ones, the stylopodium will be found to be conical. In any event it is large and prominent, and may or may not become conical. When depressed, we have not found it entire.

1. **C. maculata** L. Spec. 256. Stout, 2 to 6 feet high, stem streaked with purple: leaflets oblong-lanceolate (narrower above), coarsely serrate: fruit oval, 2 lines long, with no strengthening cells and large oil-ducts; seed-section roundish (figs. 97, 98).—Throughout our range and westward.

2. **C. bulbifera** L. Spec. 255. More slender, 1 to 3 feet high: leaflets linear, sparsely toothed: upper axils bearing clustered bulblets: fruit (seldom matured) oblong, 2 lines long, with groups of strengthening cells beneath the ribs and smaller oil-ducts; seed-section somewhat dorsally flattened. —Common northward.

CYNOSCIADIUM DC.—Fruit ovoid, not flattened either way: carpel with 5 strong primary ribs, lateral ones much the larger, forming a broad corky margin, a large group of strengthening cells in each rib: oil-ducts solitary in the intervals, two on the commissural side: seed-section somewhat flattened dorsally: stylopodium conical (figs. 101–104). —Glabrous annuals, with pinnately divided cauline leaves (leaflets linear), mostly undivided lower and radical leaves, white flowers, and persistent calyx-teeth.

1. **C. digitatum** DC. Mem. Umbel. 44 t. 11. Slender, 1 to 2 feet high: radical leaves linear-lanceolate, entire; cauline leaves palmately 3 to 5-parted: fruit a line long, contracted into a neck at summit, with very prominent ribs and minute calyx-teeth (figs. 101, 102).—Wet ground, Arkansas, Alabama, Louisiana and Texas. Fl. May, June.

2. **C. pinnatum** DC. l. c. Smaller (in var. *pumilum* Eng. sometimes becoming cespitose): cauline leaves pinnately

divided into few distant segments, terminal one much the largest; radical leaves similar or often entire: fruit 1½ lines long, not beaked at summit, with less prominent ribs and very prominent calyx-teeth (figs. 103, 104).—Wet ground, Arkansas, Indian Territory and Texas. Fl. April.

DAUCUS Linn.—Fruit oblong, flattened dorsally: carpel with 5 slender bristly primary ribs and 4 winged secondary ones, each bearing a single row of prominent barbed prickles: oil-ducts solitary in the intervals (that is, under the secondary ribs), two on the commissural side: seed-section dorsally flattened, the face somewhat concave or almost plane (figs. 105, 106).—Bristly annuals or biennials, with pinnately decompound leaves, foliaceous and cleft involucral bracts, concave umbels (connivent in fruit), and white flowers.

1. **D. Carota** L. Stem bristly: ultimate segments of the leaf lanceolate and cuspidate: rays more numerous and elongated than in the next (figs. 105, 106).—Naturalized everywhere.

2. **D. pusillus** Michx. Fl. 1.164. Stems retrosely papillate-hispid: leaves more finely divided, the ultimate segments narrowly linear: umbels smaller, with fewer and shorter rays.—Throughout the southern states and westward.

The varieties microphyllus and scaber simply depend upon the varying character of the hairs, a character not to be relied upon. This species is a very close American representative of the European D. Carota, and it is really questionable whether they should be kept specifically apart. The fruit is so exactly similar in both species that it can not be distinguished, and hence our figures 105 and 106 represent D. pusillus just as well as D. Carota.

EXPLANATION OF PLATE XV.—Fig. 87, fruit of Trepocarpus Æthusæ; fig. 88, section of carpel of same; fig. 89, fruit of Sium cicutæfolium; fig. 90, section of carpel of same; fig. 91, fruit of S. Carsoni; fig. 92, section of carpel of same; fig. 93, fruit of Berula angustifolia; fig. 94, section of carpel of same; fig. 95, fruit of Crantzia lineata; fig. 96, section of carpel of same; fig. 97, fruit of Cicuta maculata; fig. 98, section of carpel of same; fig. 99, fruit of C. bulbifera; fig. 100, section of carpel of same; fig. 101, fruit of Cynosciadium digitatum; fig. 102, section of carpel of same; fig. 103, fruit of C. pinnatum; fig. 104, section of carpel of same; fig. 105, fruit of Daucus Carota; fig. 106, section of carpel of same. Fig. 87, is × 5; figs. 89, 91, 97, 99, 101, 103, 105 are × 8; figs. 88, 93, 95, 98, 100, 102, 104, 106 are × 25; figs. 90, 92, 94, 96 are × 40.

Plant Odors.

ARTHUR J. STACE.

In furnishing descriptions of plants to aid the learner in identifying them, the odor is an important element, but we often find it neglected. The cause of this neglect is manifold; the poverty of our language in affording names to distinctions of odor, and the difficulty of determining what are the elementary odors, contributing to it, among other sources of embarrassment. The writer's object is to offer a theory by which elementary odors may be detected in their almost innumerable compounds in a way which will lead to the formation of a systematic nomenclature.

His theory is this: that, owing to the sympathetic connection of the olfactory nerve with the nerves controlling the organs of secretion and excretion, each elementary odor produces a specific effect on some one of these organs and may be recognized by this effect.

Thus, it is not only true that the alliaceous odor stimulates the lachrymal glands, producing in sensitive persons an actual flow of tears, but conversely, if we find any odor that so stimulates the lachrymal glands it is a proof that it contains the alliaceous element.

It may be said that the odor of wood-smoke excites the lachrymals, although it is not alliaceous: but it is not the odor of the smoke; it is the impact of particles of the smoke upon the eyeball that does it. Protect the eyes effectually against the smoke and no such effect will be perceived from the mere odor.

Again, it may be said that the lachrymals may be excited by any odor that brings pathetic incidents to mind. The odor of sweet basil, for instance, recalling the affecting tale of "a pot of sweet basil," may make some sentimental young lady weep. But we are not concerned with the effects of association, where the nervous system is reached through the mind, but speak only of the direct, physical effect of odors. No one ever attributed pathos to an onion.

For another example, the odor which excites the salivary glands is the parsley odor, an element common to the whole order Umbelliferæ. It may be said that anything good to eat will excite the salivary glands; that a hungry man's are ex-

cited by the smell of roast beef and a child's by the mere sight of candy. But that is because the man wants to eat the beef, and the child to eat the candy. Now, when the smell of parsley excites the salivary glands, one does not necessarily want to eat the parsley.

There are other appetizing odors, for instance, that of oak sap, which hangs around a saw-mill, but it does not excite the saliva. It stirs some of the deeper digestive fluids, probably the gastric juice.

Opposed to this last is the nauseating odor which belongs to the order Solanaceæ. Lifting up tomato vines on a dewy summer morning one will get the full benefit of it. It will enable us to understand the difficulty found in introducing the use of the potato as an article of diet into Europe, and to appreciate the fallibility of the human nose as a guide to wholesome food.

As there are many organs concerned in the functions of alimentation, so there may be as many different appetizing odors. It is not always easy to decide on the organ acted upon by each odor. The perfume of spice, for instance, the element common to nutmeg, allspice, mace and cloves, is appetizing, but whether through the stimulus it gives to the liver, the pancreas, or the intestinal juices, it would be rash for me to say. Combined with a weedy element in Lindera Benzoin, it still retains its appetizing quality; but we do not so readily recognize it as appetizing when in combination with the delicious but cloying fragrance of the pink, sweet-william and carnation. Sweet odors are destructive of appetite, though they are not nauseating. They must, therefore, have an effect the reverse of stimulating on the hypogastric fluids.

The well-known odor of turpentine, found in various combinations among the Coniferæ, and in the genus Silphium, acts as an irritant upon the kidneys, as every one confined to the atmosphere of a paint-shop will corroborate.

The odor of musk, represented in the vegetable world by Mimulus moschatus and some other species of the same genus, is a notorious aphrodisiac; while an element in the fragrance of camphor, frankincense and cedarwood has the opposite effect. Scarcely anybody will acknowledge that he likes the smell of musk, but nevertheless the perfumers regard it as a principal source of profit.

There is a delightful fragrance belonging to flowers of widely different species which agree in having a waxy texture, a white color, and a disposition to open, or to keep

open, during the night. Such is the perfume of the tuberose, jessamine, white lily (L. candidum), night-blooming cereus and many others. Delightful as it is, its physiological effect is undesirable. It enervates the system, and sometimes even causes headache. Opposed to this is the bracing odor of the hop, found also in hemp, although in a less pleasant combination. The hop aroma restores the balance of the nervous system, allays headache, and promotes a healthy, refreshing sleep. The absinthine odor of wormwood, chamomile, chrysanthemum and many other plants stimulates the skin to healthy action, relieves fever and promotes perspiration.

And now, to test the practical value of the theory, take a plant, hitherto unknown, with a labiate corolla and didynamous stamens. Its appearance indicates that it may belong to one of several orders, Scrophulariaceæ, Acanthaceæ, Verbenaceæ, or Labiatæ. The first impulse is to smell it, and the presence of a peculiar element in the odor will determine the search for it among the Labiatæ. Do the Labiatæ all smell alike, then? Far from it, for an educated nose would never mistake peppermint for spearmint, much less for thyme, sage, catnip or lavender. Then, are the other orders mentioned devoid of odorous species? Linaria is decidedly odorous, though by no means fragrant: Veronica, in some of its species, has a faint but agreeable smell, and Lippia citriodora a delightful fragrance. What common element is there, then, in the various odors of the Labiatæ by which the species of that order may be generally identified? The epithet "aromatic," applied to them, will not help us, for the same epithet is applied to absinthine, spicy, balsamic, lupuline and many other distinct odors. We must recognize it by a peculiar physiological effect produced by it. On some sultry August day, one is walking, tired, thirsty and faint, when the foot accidentally strikes a patch of mint, and the atmosphere is filled with the perfume. It will be agreed that a refreshing sensation is the immediate result. How the sensation is produced I do not pretend to say; but am inclined to describe it as a cooling of the mucous membrane lining the nose, pharynx and mouth. This peculiar sensation is the effect of an odor common to all the Labiatæ. I have noticed it in Monarda fistulosa, a plant with a smell distinct from that of mint, owing to the presence of a citric element which mint lacks. I have detected it beneath the honeyed sweetness of thyme and lavender, as well as under the absinthine element in sage, and the scarcely agreeable geranium element in ground ivy. In some of the

Labiatæ, Teucrium for instance, it is scarcely perceptible, but there are exceptional cases.

I would like to show that the characteristic element in the Cruciferæ has an opposite or thirst-exciting effect, and to point out the effects of citric, amygdaline, malic, nutty and other odors, but enough has been said to illustrate my meaning.

BRIEFER ARTICLES.

A Study of Silphium perfoliatum and Dipsacus laciniatus in regard to insects.[1]—The upper surface of the leaf of Silphium perfoliatum near the axis is thickly set with small hairs. Their length is on the average about .17 mm. They are composed of four cells each having a distinct nucleus; the upper one is somewhat enlarged. Some of the hairs are colorless, while in some a peculiar brown substance was seen which was variously distributed, sometimes in masses at the top of the upper cell or diffused through the upper cell, and sometimes through the lower ones as well. These hairs point toward the tip of the leaf. Similar hairs were found all along the mid vein, side veins and veinlets of the upper surface of the leaf, and also on similar portions of the under surface. No difference was seen between these hairs and those near the axis, except that they were much more thickly set along a surface about an inch in length at the base of the leaf. The leaf examined was about 20 cm. long and was typical.

The brown material does not seem peculiar to the hairs. Upon the upper surface of the leaves were found some more very small prickles composed of two cells, the upper very pointed, the lower one globular and containing an onion-shaped mass of brown matter similar in appearance to that in the hairs. In the epidermal cells of the stalk were found similar masses, and some cells were completely filled with it.

The cavities formed by the perfoliate leaves are very small and hold but a few cubic centimeters of water. They are full after any rain or heavy dew, but are often dry before noon. If cups are dry at night they will be filled in the morning when there is a heavy dew; otherwise they will be dry.

These cups do not appear to serve any purpose as insect catchers. No insects were seen in any of the cups. This plant is not native here,[2] and perhaps it does not show its full development with us.

Is Dipsacus laciniatus insectivorous? To answer this question was the purpose of the following observations:

It is well known the connate leaves of this plant form cups sur-

[1] Read at meeting of A. A. A. S., New York, August, 1887.

[2] Lansing, Michigan.

rounding the stalks, which most of the time contain more or less water. It has been suggested that the purpose of this arrangement is to catch insects for the nutrition of the plant.

A microscopical examination of the leaf surface was made, to discover, if possible, any peculiar organs of absorption. Especially was that portion of the leaf explored that is much of the time beneath the water in the cups. On this portion of the leaf were found two forms of hairs. The more numerous were about .09 mm. long, with a club shaped upper portion upon a pedicel composed of a single cell. The upper part was composed of about five nucleated cells; it was broader than thick, and seemed to be divided by a partition across the narrow way. These hairs were all inclined toward the tip of the leaf with the broad side toward the leaf surface, and were not very numerous. The rarer form of hairs had a rounded head upon a pedicel of a single cell. The head was divided into a number of cells which contained no visible nuclei, but were generally filled with brownish-green masses of granular matter.

Other portions of the leaf were also examined, and upon the whole upper surface along the mid vein, side veins and veinlets, were found hairs similar in form to these and equally numerous. They were also found on the corresponding portions of the under surface of the leaf. So far as *special* organs of absorption are concerned, that part of the leaf below the surface of the water shows no advantage over any other part.

Twenty plants were watched carefully for two weeks, and during that time but few insects were caught, and those were mainly bees; the nutrition from the insects caught could be but little.

Water was gathered from several plants ten days after a rain, when it had evaporated largely and must have been concentrated. The water was filtered from suspended matter, mainly algæ and flower petals, and the starch-iodine test applied, first for nitrites and then for nitrates, and no indication was obtained of the presence of either. If present at all, they were in extremely small amounts. Nessler's test for ammonia gave a marked reaction, showing the presence of from one to two parts of ammonia in 1,000,000. To take advantage of so small an amount of ammonia hardly seems sufficient cause for such a modification of the leaves, with no *special* organs for absorption. It would seem that the plant might get some good from the ammonia in the water, and perhaps these hairs may absorb the nitrogen compounds from air or water. But this supposition would include all similar hairs on both surfaces of the leaves, and would not account for the cups; it can only be an incidental advantage, therefore, and not the prime use of the water-gathering cups.

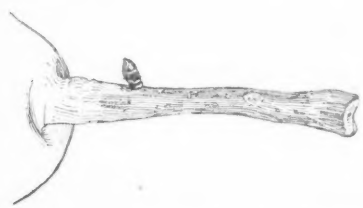
Dipsacus depends mainly on the rain for its water supply, and very little upon the dew. Some cups were thoroughly emptied, and it was found that after a heavy dew there would be a little water in the cups. This would tend to replace that lost by evaporation, but this loss is slight

because the water is so well shaded from the sun. Upon July 20, there was a copious rain that filled all the cups, and it was five days before any marked diminution of the water was noticed. At the end of fourteen days many of the lower cups still contained water. The cups were found to contain from 300 to 600 cc. An average plant would hold about a liter, and a large plant as much as a liter and a half.

It seems more probable that the object of the cups with their water is to protect the plant from crawling insects, which it does most effectually. The blossoms are frequented by bees and other flying insects, but upon the plants are found no ants or other crawling animals. The hooked prickles so thickly set along the stems, and especially on the stem just beneath the blossoms, are a perfect barrier against snails, slugs and such soft-bodied animals, while the water keeps away the hard-bodied insects. The flowers are not well arranged for cross-fertilization by ants, as the anthers and stigmas are raised so far above the throat of the corolla that ants would not reach them easily and naturally.

It is doubtless to the advantage of the plant that such insects be kept away, as they would take the nectar and yield nothing in return.

It is perhaps worthy of notice that no bridge is thrown across this moat until the falling flowers cover the surface, and then it is too late for them to be injured by marauding ants.—W. J. Beal and C. E. St. John.



Bud on a pear stem.—The Howell pear often presents a curious anomaly in bearing a well-developed bud upon its fruit stem. The accompanying cut shows such a bud borne a half inch below the base of the fruit. This singular disposition is additional proof, if any were needed, that the fruit stalk is essentially a true stem, bearing a transformed cluster of leaves.—L. H. Bailey, Jr., *Agricultural College, Mich.*

Cultivation of saccharomycetes.—Some fermentation experiments with which I was engaged during the past summer required the application of pure yeast, free from other organisms capable of producing fermentation. The methods of separation and cultivation employed were very successful, and may suggest something of value here.

A few drops of fresh beer-yeast were shaken in a test tube with sterilized gelatine, which had been melted and cooled again until it was barely fluid. This, flowed upon sterilized plates, gave in twenty-four hours, at ordinary room temperature, a great number of colonies of schizomycetes and saccharomycetes, from which, with the aid of an ordi-

nary dissecting microscope, it was easy to inoculate new cultures. The gelatine was of the ordinary composition in daily use in the laboratory, viz.: ten per cent. gelatine, ten per cent. grape sugar, Liebig's "Fleisch Extract" added to give a yellowish brown color, and neutralized with sodium carbonate. Such a mixture is solid at 25° C.

For further culture the isolated gelatine plate colonies were inoculated into sterilized solutions consisting of an extract made by boiling 200 grams of yeast in a liter of water, filtering, and adding ten per cent. of grape sugar. In such a solution an inoculation of a few yeast cells usually increased in from twenty-four to forty-eight hours sufficiently to cover the sides and bottom of an ordinary 200 cc. flask with a thick white sediment. The cultures were most strong and active at the end of forty-eight hours. The supernatant fluid was then poured off, leaving the yeast deposit comparatively dry, twenty cc. of sterilized water added, and in this condition transfer to the sugar solution undergoing observation was easy, by means of a pipette. By this method, and the use of the extract of yeast as a nutritive solution, pure cultures were repeatedly obtained which excited as active fermentation as the fresh yeast from the breweries, a result not always obtained by the use of artificial nutritive solutions. The original gelatine plate cultures, on account of their rapid growth, were useless after thirty-six hours, and to avoid a constant renewal of the process, as well as the introduction of different species of saccharomycetes, inoculations were made into gelatine tubes. The cultures thus obtained produced characteristic, elegant, ivory-white colonies of 3-6 mm. in diameter, and then further development ceased. In this state they retained their vitality, and were constantly referred to as a source of inoculating material for two months. Probably they remained vigorous much longer, as saccharomycetes are well known to do, but at this time my need of them came to an end.

Such a dormant vegetative state might be favorable to the production of spores, which, according to the prescribed methods, I have had difficulty in obtaining. At least, for the object desired, the method given was found very convenient and successful.—W. E. Stone, *Göttingen.*

The preparation of agarics for the herbarium.—It will be generally admitted that the wretched condition of most specimens of fleshy fungi in herbaria and published exsiccatæ makes them practically worthless for purposes of comparison and identification. The purpose of this note is to call attention to a practicable process for greatly improving the quality of such specimens and so rendering them really valuable.

In 1880, G. Herpell, of St. Goar, Germany, published an account[1] of his method for the preparation of herbarium specimens of fleshy fungi, and from 1881 to 1884 issued illustrations of his method in the form of four small fascicles of Agaricini, under the title, "*Sammlung präparirter Hut-*

[1]Das Präpariren und Einlegen der Hutpilze. Bonn, 1880.

pilze," certainly by far the finest exsiccatæ of this group ever distributed. A partial translation of his article was given by W. R. Gerard, in the *Bull. Torrey Bot. Club* for March and May, 1881.

The writer has succeeded in simplifying Herpell's process without much sacrifice of efficiency, and offers the following abstract of the method, as modified: The whole fungus is split vertically with a sharp knife into halves. From one half a thin slice is taken by a careful cut parallel to the first, and laid aside as No. 1. From the other half the stipe is cut off close to the pileus, and gills and flesh are removed as completely as possible from both pileus and stipe, so as to leave only their outer surfaces intact. These shells of pileus and stipe are Nos. 2 and 3, respectively.

The three preparations thus made are now laid, right side up, on a prepared adhesive paper, covered with unsized muslin, and placed between driers of heavy felt paper, under a moderate pressure.

Great care should be taken not to destroy any delicate portions of veil or volva which may be present in making the various preparations, which should show (1) attachment of gills and nature of interior of stipe, (2) nature of top of pileus, (3) nature of surface of stipe and presence or absence and nature of veil and volva. Either of the adhesive papers in use for strapping plants to the herbarium sheet serves excellently for this purpose, viz.: Dennison's gummed paper or photographers' albumen paper. The latter, perhaps, gives rather better results. Driers should be frequently changed, and pressure should be secured by *weights*, not by screws. When the specimens are partly dried the muslin may be carefully removed; and when wholly dried they will be found to be firmly attached to the paper, their adhesion to which has prevented the shrinking so prominent in the common method of drying these fungi.

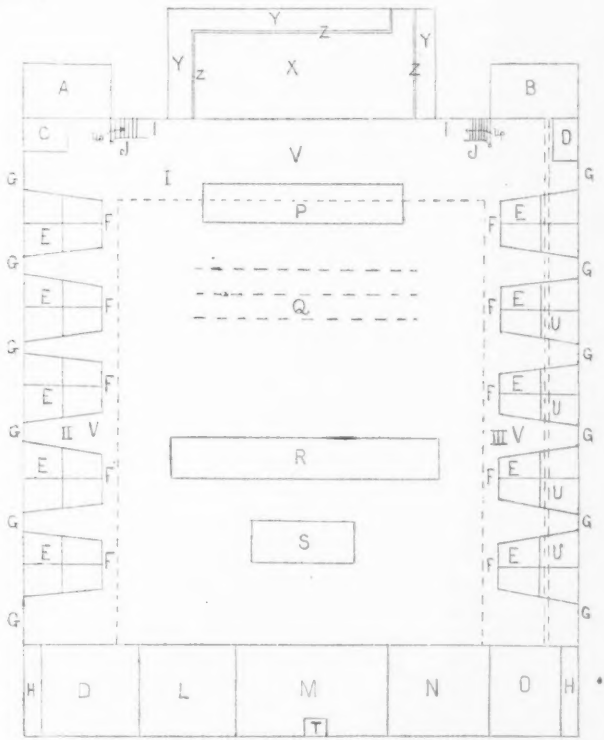
The paper is now to be cut away with knife or scissors close to the edge of each preparation, which is then ready for mounting. No. 1 is first glued to the mounting paper; then No. 3; lastly No. 2 is put on, overlapping No. 3 in such a way that the two together give a profile view of the living fungus.

Spore preparations made in the usual way on adhesive paper are permanent, since almost any pileus has sufficient moisure to soften the gum or albumen, which dries when the pileus is removed and holds the spores fast. This can then be mounted with the other preparation to complete the specimen.

Many little points will suggest themselves in carrying the process through, but the above is an outline of its essential features. It does not wholly obviate the necessity for colored drawings of the fresh fungus, but renders them less indispensable and makes the preparation alone really useful. The time required to make a good specimen is, of course, much longer than is needed to dry and press an agaric in the old way, but is less than that required for a good specimen of a flowering plant, and the

difference in time consumed by the two processes is not at all commensurate with the difference in value of the results.—JAS. E. HUMPHREY, *Bloomington, Ind.*

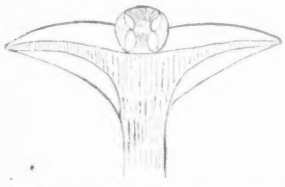
Plan for botanical laboratory.—The BOTANICAL GAZETTE for July, 1885, published an outline course in plant chemistry. A laboratory desk arranged for such work was figured in the same journal for the following November. It is believed that the laboratory sketched below will be found convenient for the study of plant anatomy as well as of plant chemistry.



A, teacher's private laboratory. *B*, small laboratory for special work. *C*, large spectroscope. *D*, balances; shelves above hold measuring dishes. *E*, students' working desks (BOT. GAZ., July, 1885); above each set are spaces for charts and pictures. At *F*, end of each set of four desks, is a writing-desk and book-shelf. *G*, windows; brackets are to be

placed alongside for holding pots of the plants that are being studied. *H*, entrances to laboratory. *I*, doors to botanical garden. *J*, stairs to gallery above. *L*, drying oven: the water is also distilled here. *M*, instruments for taking melting and solidifying points. *N*, combustion furnace. *O*, closet for supplying the chemicals on the students' desks; one side has the following for organic work: petroleum spirit, ether, absolute alcohol, chloroform, carbon bisulphide, benzole, Meyer's solution, gold chloride, Fehling's solution, gelatine, milk of lime, carmine, mounting material: the other side holds the usual re-agents for qualitative and quantitative analysis. *O*, hood for generating H_2S and chlorine. *P*, lecture table: behind is a blackboard which may be pushed down and leave white walls for receiving pictures from stereopticon at *T*. *Q*, chairs with desks for taking lecture notes. *R*, table for distilling apparatus; pulleys to be attached to the condenser for purpose of convenient adjustment. *S*, mills and mortars. *V*, gallery, indicated by dotted lines; I is the library, II for storing chemicals and apparatus, III herbarium; one side is for dried, the other for alcoholic, specimens; shelves can be drawn out to support specimens during examination; the cupboards below hold presses, herbarium paper, etc. *X*, green-house for the study of plant physiology. *YYY*, shelf for growing plants, a certain portion being set aside for each student's use. A pneumatic trough, *ZZZ*, runs around the exposed edge of this shelf. Gases to be employed in experimenting upon the living plants are brought from the main laboratory through tubes. The trough may be covered and made to furnish a support for plants while applying electricity, heat, etc.

In arranging this laboratory, the object has been to bring everything together that could be needed in the study of a plant. Too much can not be said against teaching any natural science so as to make the student feel that science cuts a natural object into parts.—LILLIE J. MARTIN, *Indianapolis, Ind.*



Proliferous fungi.—My attention has been called this season to several proliferous fungi belonging to Agaricini. On the top of the pileus appears a secondary pileus, which is reversed, bearing the gills on the upper side. A specimen of *Lactarius cinereus* Peck before me has a secondary pileus which is located in the center of the primary one. It is nearly spherical and sessile. The gills are borne on the inside, being exposed only by a small opening at the top as shown in the cut.—F. L. HARVEY, *Orono, Me.*

EDITORIAL.

IT IS customary to speak of the botanical work constantly issuing from the German laboratories as representing the highest attainment in botanical activity and accuracy. In a contrast with German botanists, American workers are placed in an inferior position in the estimation of the botanical world. The first statement is undoubtedly true, while the second is no discredit to American botanists, as we desire to show. Botanical activity and botanical ability were never greater in this country than at the present writing. The older botanists add to long lives filled with most enduring work an abiding zeal that associates them with the youngest workers, while an abundance of strong new blood gives promise of a most vigorous development. It is no lack of ability among American botanists that ranks them below their transatlantic brethren, but lack of opportunity, and lack of opportunity comes from lack of equipment. Money-givers and boards of control in this country have no appreciation of the conditions necessary for good botanical work. They think their duty is done when they have employed a man, who is then expected to make bricks without straw. The Botanical Garden at Cambridge, and the noble gift to American botany made by Mr. Shaw of St. Louis, are illustrations of what should become more general. One of the most essential things, and one of the very great advantages of German botanists, is the establishment of a botanical garden. This should be considered the necessary foundation for every botanical position from which original investigation is expected. In fact, the investigator, with his lecture room and laboratories should be considered as a part of the equipment of a botanical garden. It seems to us that this is the imperative need of American botany. It need hardly be said that such an equipment includes the element of time which will make investigation the chief thing and teaching incidental. Our appeal, then, is for friends of American botany to establish botanical gardens, and so endow them that they will not only become seats of botanical investigation, but also inciting causes of similar institutions everywhere.

A CORRESPONDENT of *Science* asks if the trumpet-creeper is poisonous. Such a query might be raised about many plants generally regarded as innocuous. Rhus poisoning is taken as the standard of comparison, in which the virulent effluence is potent enough to affect specially susceptible persons through considerable distance, and a far larger percentage of persons by contact. The most unexpected and harmless plants may be brought into the category. An instance within the writer's knowledge was that of a clear-minded lady of a botany class, who found

the large white lady's-slipper (Cypripedium spectabile) a plant to be avoided: and the absurdity of the notion in the opinion of the other members of the class did not in the least change her positive assertion of its poisonous qualities. It would be a curious and, withal, an interesting inquiry to trace up and catalogue such experiences and to investigate the nature of the poisoning, if such it be. The subject has considerable of the indefiniteness and evasiveness of the ghost, haunted-house and mesmeric questions now being investigated by the society for psychical research, and it may be doubted by some if the results of the inquiry would be any more valuable. There is, however, the substantial question of rhus poisoning, whose etiology has not yet been settled, to afford a *point de résistance*, and when that is fully elucidated the more obscure cases may, to some extent, fall easily into place. Even a knowledge of the extent of the subject would have a value.

OPEN LETTERS.

Organized botanical work.

It seems to me no more important suggestion looking to the promotion of the progress of botany in this country has been made than that of Prof. Farlow, in his paper entitled, "The Task of American Botanists," in which he urges that the amateur botanists of America be organized and their work directed. There are hundreds of educated young men and women in this country who are capable of doing something to promote botanical knowledge, some in one branch, some in another, and who are also eager to do it, but they need to be told what to do, what subjects to investigate. They are desirous of working, but do not know where to begin; or, perhaps, in many cases, they are industriously studying a subject which is too large for them, or one which has already been satisfactorily wrought out, so that their work profits none but themselves. In this way the science suffers an immense loss.

Now, it seems to me, a practical scheme might be devised whereby most of this wasted or misapplied talent might be turned into useful channels. Astronomers are organizing for the systematic study of the heavens; why should not the botanical talent of the country be similarly organized for the purpose of furthering botanical research in a systematic manner?

E. S. BASTIN.

Chicago, Ill.

Crackling sound of Utricularia.

I write to ask an explanation of the distinct crackling sound produced by Utricularia vulgaris when it is disturbed. I had for some time supposed it was to be heard only from fronds removed from the water and beginning to dry, but I find the same phenomenon when the plants, old ones filled with sacks, still in the water, are disturbed. On shaking

such a stem the rattle is distinct, the separate clicks being as loud as those made by slowly winding a watch. After the first series of clicks the plant must rest some time before a second disturbance will produce a second fusillade. D. S. KELLICOTT.

Buffalo, N. Y.

Bees mutilating flowers.

The note on bees mutilating flowers, in "Open Letters," was interesting to me, having been interested in the same subject myself. I believe it is considered safe to plant two colors of balsams (Impatiens balsamina) in adjacent rows without their mixing. Not being satisfied to take it for granted, I sought the reason. Upon examination I found the anthers were closely pressed to the stigma, thus insuring self-fertilization without any outside help. Also, as the flower became double, the opening to the spur was entirely closed by petals. Humble-bees, in seeking for honey, were obliged to visit the "back" of the flower and puncture the spur. I never saw one visit the inside of the flower nor puncture a spur that had been visited before, though it did not seem to learn that fact until it visited each flower.

Humble-bees, in getting the honey from Salvia splendens, enter the calyx and slit the corolla. This is a very interesting subject, and any one observing anything bearing on the subject would do well to make notes and send them for publication. E. S. MILLER.

Wading River, N. Y.

CURRENT LITERATURE.

Fossile Pflanzen aus der Albourskette, von Dr. A. Schenk. Bibliotheca Botanica, Heft 6, 4to, pp. 14: pl. ix. Cassel: Theodor Fischer, 1887.

The Albourskette, the locality from which the fossil plants herein described were obtained, is a mountain chain on the southern and western sides of the Caspian sea in Northern Persia. It is a locality difficult of access, and consequently has been rarely visited by collectors of fossil plants. The first to explore these plant deposits was Dr. Göbel, of Asterabad, who submittted a small collection to Dr. H. R. Göppert for examination. From this material Dr. Göppert identified (Schles. Gesell., 1860, p. 19, 20) six species, of which four were ferns and two were cycads. From the resemblance between these plants and those obtained in the vicinity of Baireuth, and also from geological considerations, Dr. Göppert concluded these plant-bearing beds to be of Liassic age. Later Eichwald collected from the same locality the species mentioned by Göppert, as well as several additional ones, and ventured the opinion that the strata showed oölitic as well as liassic characters. The material placed at the disposal of Dr. Schenk was collected chiefly by Herr Tietze, from the vicinity of Hif, near Kaswin; from Tasch, which is between Sahachrud and Asterabad; and from Mt. Siodshur, near Ah. This material was much

more copious than any that had previously been examined, and from it he was able to identify 28 species, of which number 4 proved to be new to science. No dicotyledons are of course represented, the species being distributed among the various divisions as follows: *Equisetaceæ*, 2; *Filices*, 8; *Cycadaceæ*, 12; *Coniferæ*, 6. The most valuable part of the paper is the interesting comparison made between this flora and that of Franconia, Scandinavia, and Tong-King, India. Of the 28 species found in the vicinity of Hif and Tasch only 7 are peculiar. Of this number 10 are found in Franconia, 12 in Scandinavia, and 6 in Tong-King. This shows that the flora of these localities, widely separated as they are geographically, was nearly or quite synchronous, another argument pointing to the wide geographical distribution of the early floras. The American plant-beds which furnish a flora most nearly related to that of the famous Franconian beds are the older mesozoic of Virginia and the so-called triassic of Emmons, in North Carolina. From these considerations Dr. Schenk decides the age of these beds to be rhetic, placing them lower, it will be seen, than any of the previous investigators. The abundance of ferns and cycads argues for this flora a tropical temperature. Each species is carefully described and discussed, and in most cases fully illustrated.—F. H. KNOWLTON.

Sylloge Fungorum omnium hucusque cognitorum. Digessit P. A. Saccardo. Vol. v; Agaricineæ. Patavii, sumptibus auctoris; 1887. 8°. pp. 1146.

The fifth volume of Prof. Saccardo's great work, Sylloge Fungorum, will be gladly welcomed by all students of the department of mycology to which it pertains. Though devoted to a single family, Agaricineæ, it is the most voluminous one of the series yet issued. Its 1146 pages contain descriptions of 69 genera and 4639 species. The original design of the work, as the author remarks in the preface, being to collect and systematically arrange published descriptions, no attempt has been made to elucidate synonymy or to suppress invalid species. Here is a vast and difficult work for some one yet to undertake. It is gratifying to note that the spore characters have been so generally introduced with the descriptions. While the main features of the Friesian system of arrangement have been followed, some notable changes have been made.

The sections of the family are still based on spore coloration, but in an amplified sense. The section Leucosporæ has been made to include Hygrophorus, Lactarius, Russula, etc.; also, such genera of tough marcescent species as Marasmius, Lenzites, Lentinus, etc., though these are still retained in a subsection *Tenaces*. The third section, Ochrosporæ, equals Dermini of Fries with Cortinarius and Paxillus added; and the fourth, Melanosporæ, includes the Friesian Pratelli and Coprinarii with Coprinus and Bolbitius, thus reducing by one the old sections.

The subgenera of the vast genus Agaricus have been raised to the

rank of genera, and Agaricus includes only those species formerly placed in the subgenus Psalliota. Whatever may be said of the characters on which these genera are founded, this arrangement is certainly more convenient.

The exannulate species of Amanita, corresponding to section B of Fries, constitute the genus Amanitopsis, and in like manner the annulate species of Paræolus become a genus Anellaria. The same distinction, however, has not yet been accorded to the annulate and volvate species of Coprinus, though logically it would seem to be required.

Of course, there are a few omissions, but these can easily be excused in a work so vast. Students of this branch of mycology will find the volume a most useful, convenient, and even indispensable one, and will be very grateful to Prof. Saccardo for giving them such a vast amount of solid mycological literature in such a compact, systematic form, at the comparatively low price of 72 francs.—CHAS. H. PECK.

A Course of Practical Instruction in Botany: Part II, Bryophyta–Thallophyta. By F. O. Bower, D. Sc., F. L. S., and Sydney H. Vines, D. Sc., F. R. S., F. L. S. Macmillan & Co.: London, 1887. 12°, pp. 144.

The first part of this work, embracing the flowering plants and vascular cryptogams, was issued over two years ago, and noticed in this journal for May, 1885. The present part, entirely from the pen of Dr. Bowers, as we learn from the preface, completes the work with the same admirable features displayed in the first part. It is unnecessary to repeat here the general comments and criticisms made upon Part I in the earlier review, as they hold equally good for all portions of the completed work.

For mosses and liverworts under Bryophyta three types are used. Polytrichum, Sphagnum and Marchantia. The Thallophyta are divided into algæ and fungi. Sixteen types are used for the algæ, of which the first three are salt water forms representing the red and olive-green seaweeds, and the others are fresh water forms, the number permitting quite a range of well selected types. The fungi are illustrated with ten types, beginning with the common mushroom, Agaricus campestris, and continuing with the wheat rust, Puccinia graminis in its various stages, the cup fungus, Peziza, a lichen, Parmelia parietina, ergot, several molds, the white rust on Capsella, and Pythium DeBaryanum.

The selection is to be commended, and the treatment also, with some slight reservations. This stricture refers chiefly to the occasional lack of sufficiently explicit directions, in order that the learner may not go astray or become hopelessly lost in demonstrating difficult points of structure, or in attempting to find the more obscure parts referred to. Much is left to the ingenuity of the pupil, or the help to be obtained from a master.

For advanced pupils, especially those under good supervision, the work will prove most serviceable. The directions for studying the life-

cycle of the lower forms, in the cases where it can be done to advantage, is a valuable feature.

Comparative Morphology and Biology of the Fungi, Mycetozoa and Bacteria. By A. DeBary. Translated by Henry E. F. Garnsey, M. A.; revised by Isaac Bayley Balfour, M. A., M. D., F. R. S. Clarendon Press, Oxford, 1887. Roy. 8°, pp. 525; 198 wood-cuts.

A faithful and adequate translation of this invaluable work on fungi and fungoid plants places the important facts pertaining to their physiology, structure and classification within easy reach of every English botanist. A feature that characterizes the work above all others on the subject is the broad and philosophical treatment, giving not only a connected view of the whole field, but a systematic arrangement of the subject matter based upon ample knowledge and sound deductive reasoning.

The title indicates the scope of the work, the lichens being included with fungi. The course of treatment for the fungi is as follows: general histological characteristics of hyphæ and growth forms; forms of the mycelium; formation and dissemination of spores; systematic and comparative account of the several groups, the principal ones being Peronosporeæ, Saprolegnieæ Mucorini, Entomophthoreæ, Chytridieæ, Ustilagineæ, Ascomycetes, Uredineæ and Basidiomycetes, covering over 200 pages; spores and their germination; conditions of growth; and parasitism, including that of lichens. The mycetozoa comprise the myxomycetes, the Acrasieæ and some doubtful forms, which severally receive general treatment. The chapter on bacteria is an admirable summary of the chief facts and relations of their morphology and physiology.

It is needless to go over the contents of the work more specifically, for the limits of a review, even when extended, can give but an imperfect idea of the wealth of matter in so large and carefully prepared a treatise, and the opinion of the reviewer regarding its superior merits must be accepted without argumentative accompaniment.

In its German dress the work is already known to many of our advanced students of fungi, as it was issued about three years ago, being reviewed in this journal for December, 1884. The translators have not attempted to bridge the interval with notes or later discoveries which affect the text. Thus, on page 387, the statement that the germinating sporidia from the teleutospores of Puccinia graminis penetrate into the epidermal cells of the barberry, but "never into a grass," is shown by the researches of Plowright not to be unqualifiedly true. However, in spite of the mutations due to extension of knowledge, the work will be standard for many years to come.

Ueber die Bildung der Knollen. Physiologische Untersuchungen von Hermann Vöchting. (Bibliotheca Botanica, Heft 4.) Theodor Fischer: Cassel, 1887. 4°, pp. 55. Illustrated.

This memoir forms the fourth number of the Bibliotheca Botanica, under the editorship of Drs. Uhlworm and Hænlein. It deals with an

investigation into the action of light, moisture and gravitation upon the production of tubers, especially those of the potato; or, as the author has concisely stated it in the first sentence of the introductory chapter, "The subject treated in the following pages is the problem, what causes determine the position and growth of tubers." The potato was used for most of the experiments, being especially well adapted for the purpose. Besides the potato, Helianthus tuberosus and Ullucus tuberosa, the latter a South American esculent, were studied as examples of annual tubers, and two species of Begonia for perennial tubers. The author refers to de Vries' memoir (Landw. Jahrbücher for 1878) for a critical review of most of the literature pertaining to the subject.

The variety of potato chiefly used for the experiments is one not commonly grown in this country; it is known in Germany as the "six-weeks potato," in France as "marjolin," and its peculiarity consists in usually producing a thick leafless growth at one end during the period of rest, being the expansion of the terminal bud.

By many ingenious experiments it was established that light exerted a retarding influence upon the growth of the tuber, and that a certain range of temperature was also desirable. Tubers may occasionally be produced above ground in the light, as is known not only from casual observation but as proven by earlier investigators. The author showed from his own experiments that the potato stem is verticibasal; that at its base it normally produces, besides the roots, the tubers, and at the apex the foliage. When a plant is grown from a reversed cutting, the tubers are produced upon the proper base of the stem, which is now above ground and in the light. Tubers can also be produced above ground by using a cutting which has only part of one internode sunken in the soil, so that no node is below the ground to give off subterranean stolons. Another method is to start the tuber, and when the roots around the base of the shoot are of some length, to remove the old tuber and leave the stem entirely above ground but with the roots in the soil. The base of the stem, which is now above ground, produces tubers. Tubers formed above ground are small, but it was found that if the light was excluded from such a tuber it grew to the usual size.

Space does not permit a further mention of experiments or even a full statement of the results. It must suffice to say that the author concludes that the position and the growth of the tuber and the deposition of starch in the same are separable processes; that gravitation has very little or nothing to do with determining the position of tubers, but that it depends for the most part upon internal causes; and that light has a strong retarding power on their development.

The work is an excellent example of physiological research carried on with inexpensive apparatus and without the employment of a microscope.

NOTES AND NEWS.

PROFESSOR HUGO LOJKA, a Hungarian lichenologist, died at Budapest September 7.

B. T. GALLOWAY, of Missouri, has been appointed assistant in the mycological section of the Department of Agriculture at Washington.

D. BRANDIS (in *Nature*) says that the principal garden roses cultivated in Europe and in India may be traced to Western Asia and China.

PROF. WILLIAM R. DUDLEY, after traveling through parts of Germany and Switzerland, has begun his studies for the winter in De Bary's laboratory at Strassburg.

DR. VASEY'S report for 1886, as botanist to the Department of Agriculture, has been distributed in the form of an author's edition, consisting of 27 pages of text and 21 plates.

EDWARD L. GREENE, in *Torrey Bulletin*, says that Nelumbo of Baillon has precedence over Nelumbium of Willdenow, and that Nelumbium luteum should be *Nelumbo lutea* Baillon.

THE GOVERNMENT of Jamaica offers a prize of £100 for the best practical elementary text-book of tropical agriculture. Manuscripts are to be sent to the Government of Jamaica on or before August 1, 1888.

IN *Journal of Botany* for October, Arthur Bennett describes a new Potamogeton from Mexico (P. Mexicanus), and incidentally remarks that *P. Claytonii* Tuck. should undoubtedly be *P. Pennsylvanicus* Willd.

DR. E. LEWIS STURTEVANT resigns his position as director of the New York Agricultural Experiment Station at the close of the year, and will be succeeded by Mr. Peter Collier, well known for his work on sorghum sugar.

A PAPER of over two hundred determinations of fossil plants, including some new species, by Leo Lesquereux, prepared for publication by F. H. Knowlton, has been distributed as an excerpt of the *Proceedings U. S. National Museum*.

DR. GRAY and wife have returned from their six months absence in Europe in good health and spirits. The results of this visit will appear in the sadly-needed and long-looked-for volume on North American Polypetalæ.

IN *Bulletin of the Torrey Botanical Club* for October, Dr. T. F. Allen describes several new Characeæ (with five plates), two of which belong to this country, viz.: Tolypella Macounii from Niagara Falls, and Nitella Morongii from Nantucket.

COOKE'S BRITISH DESMIDS, which has been issuing in parts, is now completed. It contains 370 species, which is 160 less than recorded by Mr. Wolle for the United States. The bound volume is sold for two and a half guineas, about $13.12½. It is illustrated with sixty-six colored plates.

IN THEIR STUDY of North American Umbelliferæ Professor Coulter and Mr. Rose desire to examine collections from all parts of the country. Many of the species, as shown by our best herbaria, are greatly confused in naming. They offer to name and return any collection of Umbellifers from North America, and attention is called to the fact that good fruiting specimens are usually necessary for accurate determination.

WILL. THRELFALL is at work upon the gentians, and has asked American botanists to assist him in procuring plants, seeds, or dried specimens of our species. He offers to exchange or purchase, and will send a list of desiderata upon application. His address is Hollowforth near Preston, Lancashire, England.

WORD as late as July 29 has been received from Dr. G. M. DAWSON's party exploring the Yukon district. Only the great growth of sphagnous mosses and the abundance of reindeer moss give the country a different appearance from that of British Columbia. They speak of sometimes struggling through tangled woods knee-deep in moss.

RECENT WRITINGS on the root swellings and their bacteria-like contents in the Leguminosæ and other plants are reviewed through eight pages of the *Botanisches Centralblatt* (Bd. 31, Nos. 10 and 11) by Dr. Paul Sorauer. No reference is made to articles in English, although such have been published both in England and this country.

A DISTRIBUTION of rust exsiccati will shortly be begun under the title, *Sydow Uredineen*, to contain the different stages, æcidium, uredo, teleutosporic, and the forms upon all the different host plants. It will appear in fascicles of fifty numbers, at nine marks each. Address P. Sydow, Schoeneberg bei Berlin, Goltzstrasse 3, Germany.

BUJWID, in *Zeitschrift für Hygiene*, claims the discovery of a chemical test for the detection of the cholera bacillus. To bouillon-cultures ten to twelve hours old, and gelatine-cultures after twenty-four hours, 5 to 10 per cent. of ordinary muriatic acid is added. In a few minutes a rose-violet color appears, which increases in intensity for half an hour.

IN the *American Naturalist* for October, Dr. Bessey extends the range of several well known trees. *Pinus ponderosa*, var. *scopulorum* Eng., he found as far east as the 100th meridian, along the bluffs of the Niobrara river. Along with it grows *Juglans nigra* L., whose range is thus extended westward to the 100th meridian. Ostrya Virginica was also observed along the Niobrara river and in the Black Hills of Dakota.

THE TOMATO DISEASE called "black spot," caused by *Cladosporium Lycopersici* Plowright, seems to have become very virulent in England. *The Gardeners' Chronicle* for October 1 figures and describes it. The fungus seems first to attack the decayed remains of the style while the fruits are small and green, and thus gains access. The remarkable flattening of the apex of the fruit is one of the peculiarities of the disease.

THE HERBARIUM of H. H. Babcock, who published a well prepared list of the plants of Chicago and vicinity some fifteen years ago, was recently presented to the Northwestern University at Evanston, Ill., by his widow. It contains over 10,000 species. The herbarium of E. R. Brownell, of Hartford, Conn., deceased, containing about 2,500 species, with unnamed specimens from Cuba, has been presented to Brown University at Providence, R. I.

IN *American Garden*, Prof. L. H. Bailey, Jr., discusses the question of acclimatization. The term he restricts to the operations of man in habituating a species to a climate at first injurious. The discussion is a very interesting one, and is divided into two heads: 1. Acclimatization through a change in the individual plant; 2. Through a variation in offspring. Under each head the modification or variation in constitution and habit are separately considered.

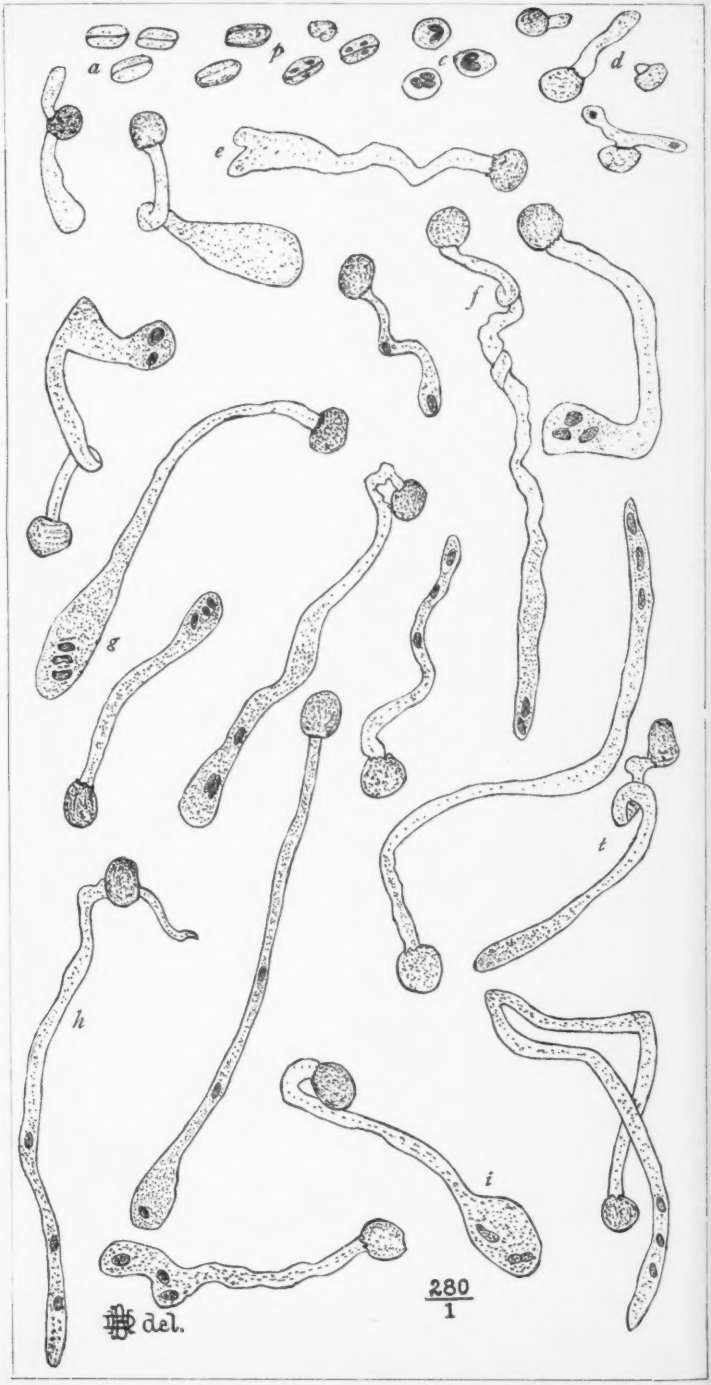
THE THIRD REPORT, to cover the year 1885, on diseases of hyacinths and other bulbous and tuberous plants, by Dr. J. H. Wakker, has recently been distributed. Dr. Wakker was employed by the General Union of Bulb Culturists of Holland to investigate for three years (1883, 1884, 1885) the diseases of flowering bulbs, and his three reports, the last much delayed in the printing, contain valuable information based upon careful research. They are written in the Dutch language.

DRUGS AND MEDICINES of North America, for June, has recently been distributed, containing the concluding part of the account of Erechthites hieracifolia, and most of that of Caulophyllum thalictroides, both plants of much therapeutic value. Upon the completion of the present volume, three or four more parts, the publishers will no longer issue it as a periodical but in completed volumes. This change is necessitated by the numerous protracted investigations on which the work is based, and which give it its special value, but which can not be invariably brought to an end at stated intervals.

THE UNIVERSITY at Graz, Austria, is to have a botanic garden, the sum of $23,000 having been appropriated for that purpose. The *Botanisches Centralblatt* points out the absurdity, from the European point of view, of expecting satisfactory results with this amount of money, as the garden at Leipzig cost $125,000, and that at Strassburg about the same. It will permit the erection of a small garden house and a green-house, but there can be no lecture rooms, no offices and rooms for investigators and no place for students, although the latter are now recognized as a necessary adjunct to a well-ordered botanic garden.

FRIEDRICH T. KUETZING, the learned algologist, will complete his eightieth year on the 8th of December next. He was one of the first to recognize that for the investigation of the cell and its life the simplest plants, such as are found among algæ, are the most serviceable. He made many profound researches, and his systematic works on the algæ of Europe are still standard. It is proposed to offer him on his eightieth birthday some mark of public recognition and gratitude for his eminent services as a naturalist. The committee having the matter in charge consists of Messrs. Ascherson, De Bary, Berthold, Cohn, Cramer, Eberstein, Haussknecht, Kny, Leitgeb, Magnus, Müller, Pfitzer, Pringsheim, Reinke, A. Schmidt, Schwendener, Solms-Laubach, Stahl, and Strasburger, mostly well known names to American botanists. Contributions should be sent at once to Otto Müller, Berlin, W., Köthenerstr. 44.

THE *Kew Bulletin* for October contains an account (with two plates) of the onion disease at Bermuda, caused by *Peronospora Schleideniana* De Bary. Observations were undertaken by Mr. Arthur Shipley, under the auspices of the Royal Gardens. The favoring atmospheric conditions are heavy dews or rains, followed by warm, moist, calm weather, and the absence of direct sunshine and cold winds. The life history of the fungus is well known to botanists, with its internal parasitism in the leaves, its conidial branches protruded through the stomata, and its reproduction by asexual and sexual spores. It is suggested that onion plants should be made as strong as possible to resist attack, and, to prevent spreading, all affected plants should be collected and burned. Diseased plants may be treated with a mixture of powdered sulphur and freshly burnt quick-lime, or sprayed with a weak solution of iron sulphate. In both cases the fungus is destroyed without injuring the plant.



HALSTED on POLLEN NUCLEI.